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Producing Localized Atony
AND
Chronic Retention of Urine

BY

F. N. OTIS, M.D.

CLINICAL PROFESSOR OF GENITO-URINARY DISEASES IN THE COLLEGE OF
PHYSICIANS AND SURGEONS, NEW YORK



Reprinted from THE MEDICAL RECORD, May 28, 1887

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ON TEMPORARY OVERSTRAIN OF THE BLADDER, PRODUCING LOCALIZED ATONY AND CHRONIC RETENTION OF URINE.¹

LONG CONTINUED obstruction to urination, as through organic stricture or enlargement of the prostate gland, while often causing a general thickening and rigidity of the bladder-walls, is recognized as capable, in certain cases, of producing a mechanical overstrain and consequent thinning of the muscular structure of the bladder, diminishing its contractile power, and thus preventing, to a greater or less extent, the complete discharge of urine from the bladder by voluntary effort.

This condition is called atony or inertia of the bladder, to distinguish it from the paresis or paralysis of the bladder which is dependent upon nerve-lesions.

While, however, atony of the bladder, as a rule, is due to long-continued urinary obstruction, and is chiefly found in elderly persons whose muscular structures are already more or less enervated, yet there is a form of this trouble which results from a sudden overstrain through even a single attack of retention, at any period of adult life, and independent of any organic obstruction. Such an attack may be the result of spasmodic stricture caused by irritation of the muscular urethra through a contracted meatus urinarius or a stricture of the urethra (even though slightly narrowing its lumen), or through inflamed hemorrhoids in persons otherwise healthy. It may occur through temporary loss of sensibility, as from the effects of alcohol or narcotics; or during the course of a low fever; or from a convulsion or any nervous shock; also from disregard of desire to urinate, or from sexual irritation

¹ Read at the meeting of the Association of Genito-Urinary Surgeons of America, at Lakewood, N. Y., May 18, 1887.

or excess. A retention from any cause may, within the space of even a few hours, produce an overstrain of the muscular structures of the bladder, causing entire loss of the voluntary power of urination ; a loss which, especially if occurring in advanced life, not infrequently necessitates the use of the catheter for the passage of every drop of urine during the remainder of the patient's lifetime.

The frequency with which such accidents as the foregoing have been brought to my notice has impressed me with the importance of, if possible, a greater solicitude in regard to the condition of the bladder in all persons who have been for any period insensible from any involuntary cause, or who have experienced any decided nervous shock, or who are the subject of any urinary difficulties.

I desire on this occasion to call attention to a few cases in my own experience bearing on this point.

In the first place, in order to illustrate the cause which I believe to be the most frequent in producing urinary retention, and thus atony of the bladder, to a greater or less extent, I will cite a case reported to me by the late Prof. R. W. Pease, of Syracuse, some time since :

General H——, aged sixty-five, previously free from all urinary trouble, while walking was seized with a desire to urinate, and on attempting to do so was quite unable to pass a drop. Dr. Pease was called some few hours after, and attempted to draw his urine by means of a flexible catheter, No. 20 (F.) ; the size of the meatus passed the instrument readily as far as the bulbo-membranous junction and there it was arrested. Various sizes, soft and metallic, were used with the same result. A consultation was called, in which several prominent physicians and surgeons of Syracuse took part. The patient was etherized, and efforts were made with various instruments, from No. 20 (F.) to the filiform size, to enter the bladder, but without success. There was no enlargement of the prostate. As the bladder was then considerably above the pubis, it was determined to relieve it by aspiration. Just as the aspirating-needle was about to be inserted,

mention was made of the fact that such cases were claimed by Dr. Otis to be sometimes due to a spasm of the compressor urethræ muscle, caused by reflex irritation through a contracted meatus urinarius. The meatus was forthwith divided, and the largest catheter available (30), of the French scale, was introduced, and passed readily into the bladder. As the doctor expressed it, "It slid into the bladder like a boy sliding down an ice-covered hill."

Professor Alfred C. Post related to me the following case :

In March, 1884, he saw in consultation a lawyer, aged sixty-two, with a retention of urine. There was a history of several previous attacks, which were relieved by the introduction of a small catheter into the membranous portion of the urethra. The urine flowed at this point, but the instrument could not be passed into the bladder. The trouble was believed to be caused by senile enlargement of the prostate. Examination through the rectum showed that there was no such enlargement. The orifice of the urethra was contracted to 15 of the French scale. Dr. Post incised it and passed 24, the largest catheter he then had, easily into the bladder and relieved the retention. On the following day he incised the orifice still farther, and passed a solid sound, No. 33, with ease. The patient regained at once the power of emptying the bladder voluntarily, and, after a period of several months, was found to have retained this power.

Mr. C——, aged seventy-two, referred to me by Dr. C——, of Ohio. History of difficulty of urination for two years previously. His trouble was assumed to be from prostatic hypertrophy, and the use of the catheter was commenced, using it twice in the twenty-four hours. Twice within the next few months he had a complete retention of urine for a day, with much pain; since that time was able to void but a very small quantity of urine voluntarily. Examination showed but slight prostatic enlargement. Urine increased at will through the catheter. Highly ammoniacal and purulent. Attempts at voluntary urination frequent, with pain in glans penis at close. Examination of the bladder failed to detect stone. Examination of urethra showed a nor-

mal calibre of 38 F., a narrowing at 4 inches of 5 mm., and at 3 inches one of 8 mm., also a narrowing at the orifice to 26; these strictures were divided to 38 F., and 32 F. solid sound passed easily into the bladder.

The immediate result of the operation was slight constitutional disturbance, lasting forty-eight hours, frequent necessity of use of catheter every hour or two for twenty-four hours, then a sudden improvement—intervals, six to eight hours; complete loss of pain at glans penis after voluntary urination and gradual increase of quantity voided. On the seventh day he emptied his bladder voluntarily. He went home on the tenth day with the understanding that the occasional use of the catheter should be continued until the power of emptying the bladder was fully restored. A recent letter from his physician informs me that the use of the catheter is still required to completely empty the bladder, but that there has been no retention; the pain in the glans penis, originally relieved by the operation, had returned. In this case, on account of the age of the patient, 32 sound only was introduced through the deep urethra after operation; a full distention at this point would probably have produced more permanent results, although increasing the risk of constitutional disturbance.

Mr. F——, a gentleman of seventy, suffered with posterior spinal sclerosis for several years, but was able to walk about his apartments, though with difficulty. He lived alone, declining to have any personal attendant. One morning in January last was troubled with slight diarrhoea; he took an accidental overdose of Squibb's tincture of opium. During the narcosis which followed he had a retention of urine of from twelve to eighteen hours' duration; previously to this he had no urinary difficulty. The bladder was gradually emptied by catheter, during the next twenty-four hours from three to four pints being withdrawn; urine perfectly clear. When completely recovered from his narcosis, it was found that he was unable to pass a drop of urine voluntarily. He was found not to have any prostate enlargement. This complete retention continued, relieved only by catheter, for the next two weeks, requiring its passage every two hours, day and

night, when he regained voluntary power of urination to the extent of passing an ounce or two while in the closet. As a 24 F. catheter had been easily passed, no examination had thus far been made for stricture. This was now done, resulting in finding several points of contraction, strictures of large calibre, of 13 mm. (27 F.) in a normal urethra of 40; meatus, 32 F. These were divided and 40 sound passed through the strictures, 38 into bladder. There was not the least constitutional reaction. There was an immediate increase in desire to urinate, requiring now the use of the catheter every hour or two for about a week, caused by a slight cystitis of the vesical neck. This, however, yielded to ordinary measures and he began to urinate voluntarily at irregular intervals, and requiring the passage of the catheter less and less frequently, until at the end of a month he would go five and six hours without the necessity of emptying his bladder. His general health continued excellent, his mental condition improved in a very marked degree, and even his power of locomotion was increased, but his inability to empty his bladder completely continued, having habitually from two to four ounces of residuum after every voluntary micturition. In the meantime ergot, strychnia, iron, cold-water injections into the bladder, douches, etc., had been administered, without apparently affecting the local difficulty in any way, and the case continues in about the same condition to-day.

In order to show in how brief a period over-train of the bladder may occur, I will cite another case where a slight paresis of twenty years' standing and of central origin complicated the atonic condition. The patient was able to pass the urine voluntarily, with the exception of an ounce or two of residuum. About a month since an hysterical attack followed by a uræmic convulsion occurred. Two hours preceding this the urine had been drawn by catheter. Two hours after, when I saw the case, the bladder was prominent above the pubis and I drew off twenty-three ounces of urine of a specific gravity of 1.005. This retention was followed by a complete loss of the voluntary power of urination, which continued for several days.

In May, 1885, Mr. M——, was referred to me by Dr. B. of Canada, with complete loss of the power of voluntary urination. His history was as follows: Three years ago, having had no previous difficulty in urination, he, on one occasion, forgot to void his urine on going to bed. Attempting it on the following morning, he found himself unable to pass a drop. A catheter was introduced by his physician without much difficulty, and a large amount of urine drawn off. This loss of power continued. He was obliged to learn the use of the catheter. From this time, in spite of much treatment by electricity, strychnia, mineral waters, he went on without improvement in his urinary function. After a year he had an attack of cystitis, lasting some five weeks, during which his power of urination returned and he was compelled at times to urinate every half-hour. When this cystitis passed off, however, his ability to urinate also departed and he remained in this condition absolutely without being able to pass a drop of urine voluntarily, and was obliged to use a catheter on an average of once every four hours up to the time when he came under my observation, fully two years from the date of his first attack.

The general health of the patient was enfeebled. He was the subject of great mental depression, and was much of the time absorbed in the contemplation of this bladder trouble, but he suffered no pain.

On examination, patient passed a No. 20 gum-elastic catheter with ease, although at times there was some difficulty from urethral spasm. The urine drawn was clear. There was apparently no atony of the bladder, as the urine was propelled through the catheter with force and was promptly increased at will. There was no prostatic enlargement, and nothing abnormal could be detected through examination of the bladder by metallic sounds or bimanual touch. Penis, $3\frac{1}{4}$ inches in circumference. By urethrometer, 32 mm.; at bulb and anterior two inches there was a narrowing to 25 mm. (7 mm.), for half an inch anterior to which the urethra was contracted at several points from three to five millimetres; narrowing at the meatus to 28 mm.

The presence of more or less urethral stricture had been

recognized by his physician, and as all measures used had failed to afford relief, he was referred to me for any operation which might promise to restore his urinary function.

The presence of strictures of large calibre, as in the present instance, had been associated in my experience, in many cases, with repeated retention of urine of a temporary character, in several instances producing more or less atony of the bladder. Here, however, the muscular structures appeared not to have been impaired.

I had seen and reported cases where long-continued partial obstruction to voluntary urination was caused by the reflex influence of strictures of large calibre, as proved by the immediate and permanent relief afforded by their division and the introduction of a full-sized sound, one a notable instance where a retention of three years' standing (the bladder habitually containing two pints of urine) was relieved in a similar manner; but in all the cases there was either inability to pass any instrument through the membranous urethra, or to such a degree as to warrant the assumption that the difficulty, if not organic stricture, was dependent upon spasmodic closure of this portion of the urethra from reflex irritation. In this case, however, while there was, from time to time, much annoyance from such cause during catheterization, yet, as a rule, a 20 F. catheter was readily passed into the bladder, while at no time could a drop of urine be passed voluntarily.

The complete removal of these strictures was advised, with the distinct understanding that while a complete restoration of the urethra to its normal calibre might restore the urinary function, yet it was not improbable that some organic obstruction at the vesical neck was the chief cause of the trouble, and if not relieved by the internal urethrotomy a digital exploration of the bladder through perineal section would probably be required.

On June 1, 1885, Mr. M—— was etherized, his strictures thoroughly divided by dilating urethrotomy, and a No. 32 solid steel sound passed, without force, well into the bladder. The urine was drawn by catheter, as usual, and a No. 32 sound was passed through the urethra as far as the bulb every other day for a week after the

operation. A few drops of urine had, from time to time, passed involuntarily during a passage from the bowels after the third or fourth day. On the morning of the eighth day, the urine having been allowed to accumulate until some distention of the bladder was recognized, the attempt to urinate was made; a few drops of urine only responded. This, however, gave a distinct sense of relief, but the remainder required to be drawn with the catheter. Although disappointed at the result, the patient, whose constant brooding over his trouble amounted almost to a monomania, was comforted by a rapid improvement in his general health and in his mental condition, which began immediately after the operation. The ability to void a few drops of water while at stool was the only approach to an improvement in the urinary function which had been attained by the operative measures; and it was evident that the cause was not in the urethra, but in the bladder. It was determined, however, to delay any further operative measures until the autumn, when, if the difficulty still remained, and his general condition seemed to warrant it, the digital exploration of the bladder through the perineum should be made.

Mr. M—— returned early in October, four months after, in excellent condition; but he had had no voluntary passage of urine, except the few drops when his bowels were moved. His sexual powers, which had been greatly impaired before the operation, were fully restored, and he had only the necessity of passing the catheter once in six hours, as against once in four hours previous to the urethrotomy. His urine was examined and found to be normal.

On October 9th Mr. M—— was etherized and the perineal section performed, Dr. L. B. Bangs, Dr. Norris, and Dr. W. K. Otis assisting. Introducing my finger through the perineal opening, I was unable to detect any abnormal condition in the prostate or in the bladder, which was, by means of bimanual touch, thoroughly explored in every part. There was no projection of any sort in or near the vesical orifice, no fold of mucous membrane was recognized which could be supposed to have

acted as an obstruction to urination, like Guthrie's bar at the neck of the bladder, or the vesico-urethral barrier of Civiale. The only part that even suggested any further interference was an unusual tightness at the vesical orifice, notwithstanding the thorough dilatation which it had undergone, and this was not, however, considered to require any further operative measures. A tube was introduced and retained for the next five days, when, on removing it, no urine passed through the wound or through the penis. Complete retention occurred, which was relieved by the passage of a catheter through the wound, twelve ounces of urine being withdrawn. With a Davidson's syringe I subsequently introduced water up to fourteen ounces through the tube, without producing any desire to urinate, or any tendency to flow out through the wound or urethra. My urethrometer was introduced through the perineal opening into the bladder, turned up to 45, and withdrawn without resistance. It was then evident that a faulty action of the muscles of the vesical orifice had in some way produced the obstruction. It was determined, however, to make a further digital examination, under the local influence of cocaine. This was accomplished without difficulty, and with but little pain; nothing new was recognized—the slight constriction at the vesical orifice previously noted was again detected, and it was determined to incise the tissues at that point. This was effected by introducing a straight, blunt bistoury through the perineal wound and dividing the tissue, guided by a finger in the rectum; until, upon a reintroduction of the finger into the bladder, no sense of constriction could be felt at the orifice. The tube was then replaced. There was no constitutional reaction. Forty-eight hours after the operation, for the first time since his original retention, two years previously, Mr. M— felt a natural desire to urinate, and a few drops of urine were passed through the penis. During the entire period since the commencement of his trouble the call to urinate was only through a sense of distention, which, if not responded to, was soon followed by a pain over the pelvis. On removal of the tube, urine now leaked through the perineal opening.

The day following, October 21st, the patient passed with natural sensation ten ounces of urine through the penis. From this time he passed his urine for a few days about equally through the perineal opening and through the penis, until after a couple of weeks, the perineal wound rapidly healing, the introduction of a catheter was again required, as he could not fully empty his bladder voluntarily, having always from two to four ounces of residual urine. He was advised not to make any straining effort, but in order to completely prevent this he was to use the catheter regularly for at least three or four months. Iron and strychnia internally. By November 30th he went to his home in fair general condition, using his catheter faithfully, but mentally much disturbed that his hopes of being able to void all his urine voluntarily were indefinitely deferred.

I heard nothing from the case until December, 1886, a little over a year after, when I received a letter from Dr. B. stating that our patient had recovered completely from his urinary troubles and was in excellent health and spirits. He went along worrying and using his catheter for several months after returning home, getting finally into a state bordering on hypochondriasis—complaining of inability to walk and of various discomforts. His physician sent him abroad for a few months, but he returned in the same condition. Being then unable to find any real cause for his alleged suffering, his physician then insisted upon his getting in his sleigh and driving daily about, although the temperature was considerably below zero. He at once improved. Finally he was induced to ride on horseback, and within a very short period the doctor states that our patient had found himself able to fully empty his bladder voluntarily, and from that day to the present has been able to do so, as was reported to me by letter dated April 22, 1887, concluding with the statement that "Mr. D. is as well as he ever was in his life."

The manner in which the original retention of urine occurred in the foregoing case points clearly, it appears to me, to spasmodic closure of the membranous urethra as the immediate cause, apparently due to the presence of

anterior strictures of large calibre. Speaking of this condition, Esmarch says :¹ "My experience enables me to state that spasm of the urethra occurs frequently, and is often, if not principally, the cause of retention of urine."

The direct result of the retention was not to cause a general atony of the bladder, but a disability of the muscular structures in the vicinity of the vesical neck alone.

The chief diagnostic point in the recognition of atony of the bladder, according to Sir Henry Thompson,² is the "diminished power of discharging the urine after a catheter has been placed in the bladder." In this case the power to increase the stream under such circumstances was normal, except when the bladder was nearly emptied. A localized instead of a general atony was present, and under conditions that would seem to indicate that this is a form of accident which may occur when a sudden temporary over-strain is the recognized cause of interference with voluntary micturition.

The contents of the full bladder, when acted upon by the detrusor muscle as a whole, reinforced by the diaphragmatic and abdominal muscles, appears to bring the greater force to bear on the *bas-fonde* ; and if the pressure be so great as to cause over-distention, it would be most likely to occur in the greatest degree at this point.

According to Esmarch, "the outermost longitudinal layer of the detrusor muscle passes vertically into the prostatic ring, and consequently opens the ring as soon as the detrusor contracts over the liquid ball within the bladder. The urine now enters through the prostate into the membranous portion, etc." Here, however, the condition which we call spasmodic contraction of this portion of the urethra arrests the progress of the urine, and the chief strain then falls upon the muscular fibres, which in a normal condition serve to open the vesical orifice. These, too, being attached vertically to that orifice, the force would act directly upon it, and here the atony would be most likely to occur, causing a more or less permanent disability of the emptying power of the blad-

¹ Ueber harnröhrenkrampf, Arch. f. Klin. Chir., Berlin, 1879, xxiv., 589-665.

² Thompson on Diseases of the Prostate, 3d ed., p. 174.

der. The anterior portion of the detrusor, not having been subjected to such a degree of over-strain, might by its superior tonicity cause a change in the situation of the orifice so as to form an additional barrier to the outflow of urine, which would be increased by voluntary effort to empty the bladder. The operation of incising the vesical neck, as in the case reported, it appears to me, would serve to correct in some degree the disturbed muscular relations of the parts ; but chiefly to diminish the resistance of the so-called sphincter vesicæ, and thus make the action of the detrusor more effective, both resulting together in an immediate partial restoration of the function of urination, which as the detrusor gradually gained strength through the rest afforded by the long-continued catheterization, finally brought about a restoration of the voluntary power of emptying the bladder.

The suggestions which, in reviewing the foregoing cases, appear to me most salient are :

1. The necessity of appreciating the fact that slight urethral contractions, at any point from the meatus to the bulb, are a possible cause of retention of urine, through reflex irritation, and should enter into the consideration of such cases, especially in elderly subjects, whenever such contractions are known to exist.
2. The importance of an early recognition and relief of an acute retention by catheterization.
3. That localized atony at the base of the bladder may be present in sufficient degree to wholly prevent voluntary urination, while the contractile power of the superior portion remains practically undiminished.
4. The understanding that the failure to relieve, by general medication and local measures, including the removal of sources of reflex irritation which might be considered sufficient to produce and perpetuate the urinary difficulty, should suggest the possible relief, even in long-standing cases, which may be afforded by an incision of the vesical neck.
5. That a period of several months, even a year or more, of freedom from the cause or causes producing it must not be considered too long to wait hopefully for recovery from over-strain or atony of the bladder.



